

AWS: us-east-1a 23 nodes

AWS: us-west-1a 62 nodes



portworx  
by Pure Storage

20  
Clusters Running

# 2018 CONTAINER ADOPTION SURVEY

56  
Volumes

270  
Total Nodes

15  
Nodes Down

## EXECUTIVE SUMMARY

It's clear to most industry watchers that containers are having a dramatic impact on the way enterprises deploy applications in the cloud. What isn't obvious is how fast these changes have been happening, why they're taking place, and the profound impact containers are having on new deployment models such as multi-cloud computing. This is perhaps underscored most by the shocking news in October 2018 that IBM is acquiring RedHat, mainly for its OpenShift container platform to strengthen its position in the cloud.

This week, Portworx is releasing the results of our 2018 Annual Container Adoption survey, which sheds light on these important matters as well as other strategic choices enterprises are making with containers in the cloud. The results are revealing, showing a computing landscape that is being quickly transformed by containers as businesses search for new ways to boost developer productivity, go multi-cloud, reduce infrastructure costs, and respond faster to changing customer needs.

Among the findings, our survey reveals that four out of five enterprises are now running container technologies, and an incredible 83 percent are running them in production — a huge leap from just 67 percent last year. Even we were surprised by the rapid pace at which containers are being put to use for real-world applications.

Equally surprising is the pace at which containers are ushering in new patterns of cloud usage. While increasing developer productivity continues to be the main reason for container adoption, our survey reveals a sharp increase in the proportion of respondents that are deploying containers to enable multi-cloud workloads. Thanks to containers, the promise of multi-cloud — with its benefits of improving uptime, avoiding lock-in and gaining price leverage — is fast becoming a reality.

Our survey also dives deep into questions about developer preferences and perceptions of containers in the cloud. Which public cloud is the most popular for running containers? Which is the most developer-friendly for container use? What's the most widely used container scheduler? We cover all these questions and more, and some of the answers may surprise you.

So roll up your sleeves and dive into the results of our 2018 Annual Container Adoption Survey. It explores the state of container technologies across a wide variety of industries and company sizes, to build a full picture of the current state of container usage. We hope you find it as interesting and enlightening as we do.

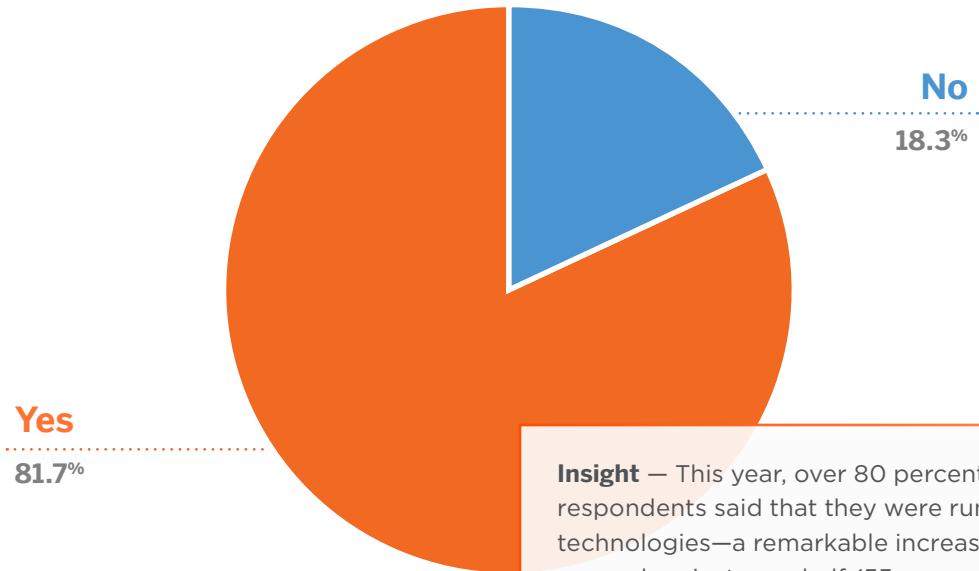
Gou Rao, CTO, Portworx

### Methodology

The 2018 survey was distributed in September 2018 and includes insights from 519 IT pros who were asked questions about the state of container usage, tooling, environments and barriers to adoption to get a snapshot of container adoption today. The 2018 survey asked many of the same questions included in previous Portworx Container Adoption survey to create a multi-year dataset that we can use to draw conclusions on how container adoption has changed over time.

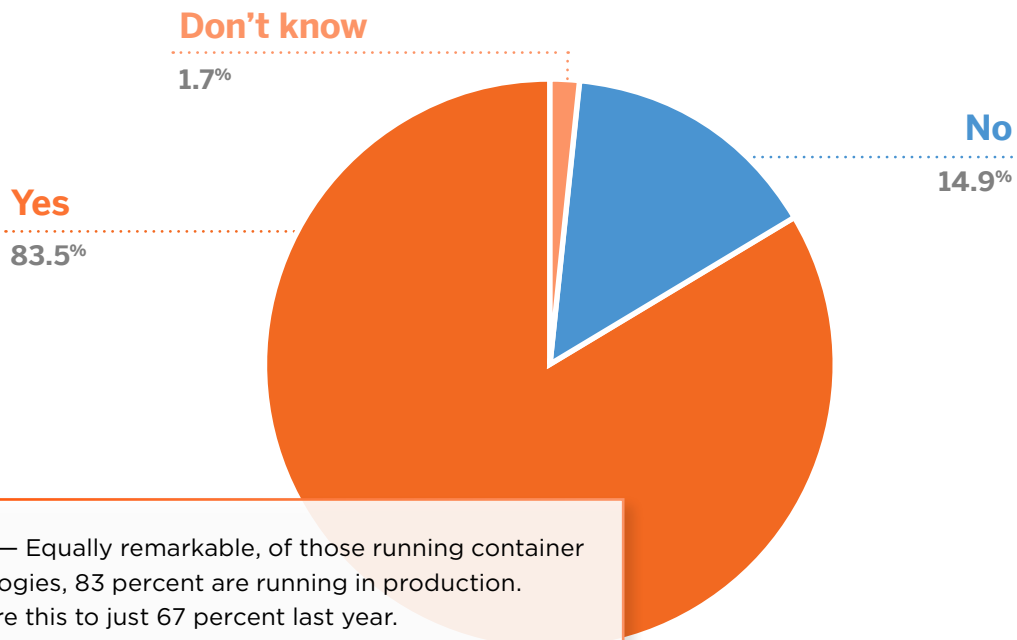
## Container adoption continues unabated

Does your organization run container technologies? n=519



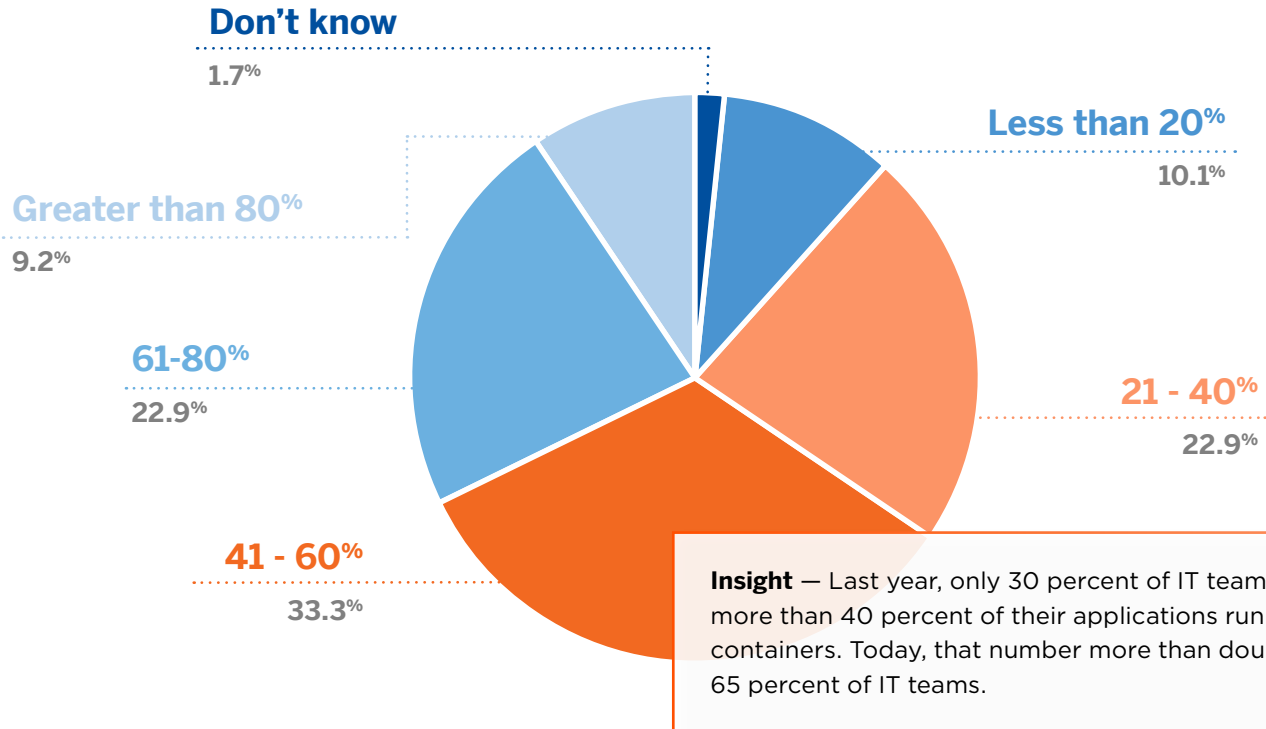
**Insight** — This year, over 80 percent of respondents said that they were running container technologies—a remarkable increase from last year, when just over half (55 percent) said they were running container technologies.

Is your organization running container technologies in production? n=424



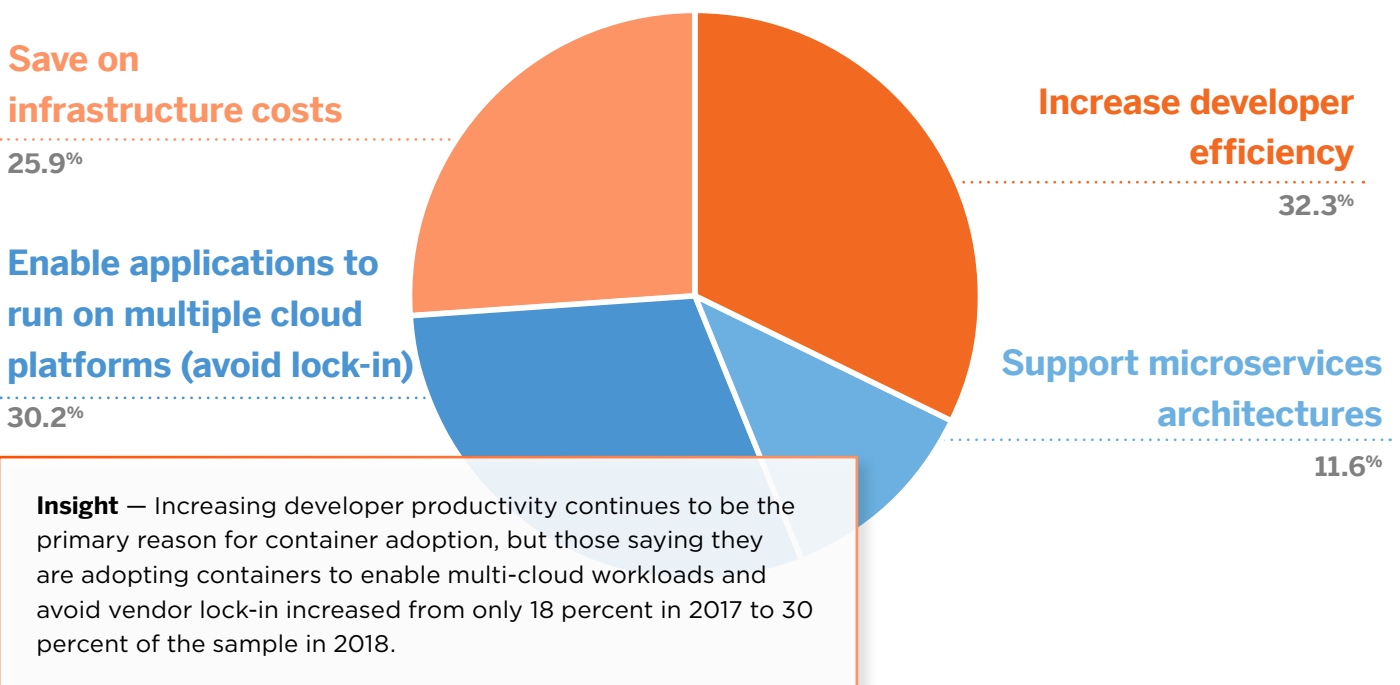
**Insight** — Equally remarkable, of those running container technologies, 83 percent are running in production. Compare this to just 67 percent last year.

## What percentage of your apps are running in containers? n=424

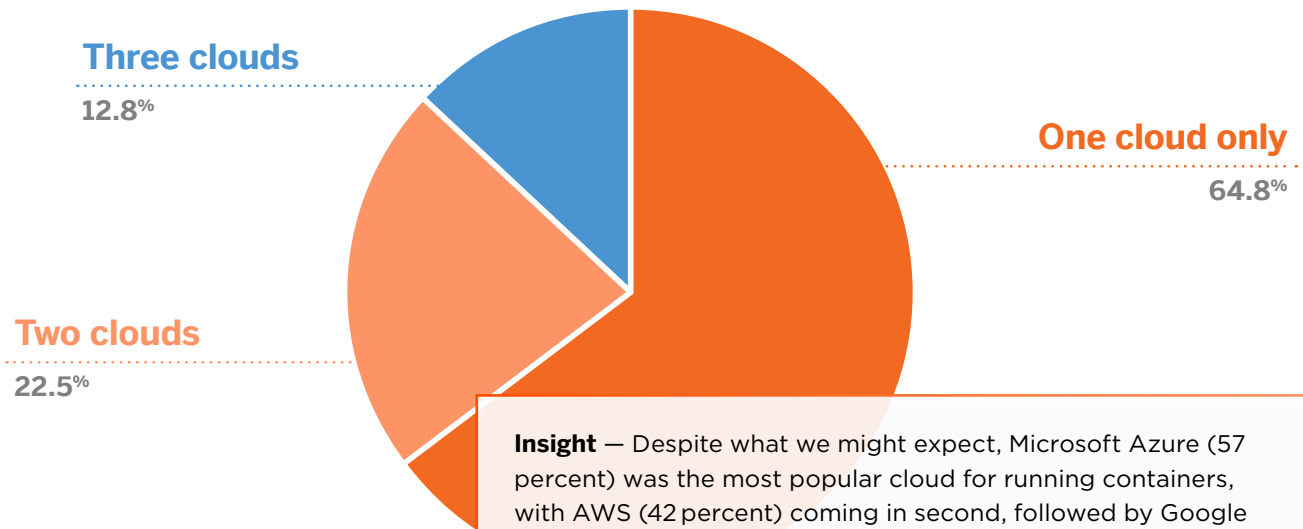


## Multi-cloud is driving container adoption

### What is the primary reason why your organization is running container technologies? n=424

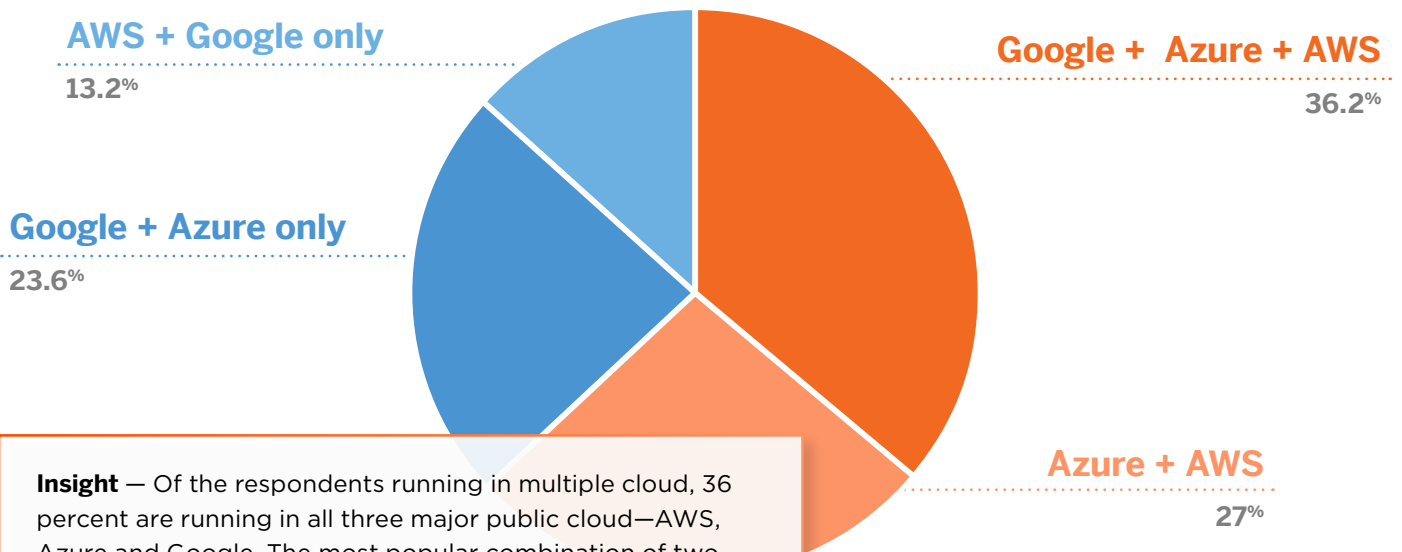


## In how many clouds do you run containers? n=494



**Insight** — Despite what we might expect, Microsoft Azure (57 percent) was the most popular cloud for running containers, with AWS (42 percent) coming in second, followed by Google (39 percent). Interestingly, however, 35 percent of respondents reported running containers in more than one cloud, with 23% running in two clouds, and 13 percent running in three clouds.

## What combination of clouds do you run in? n=494



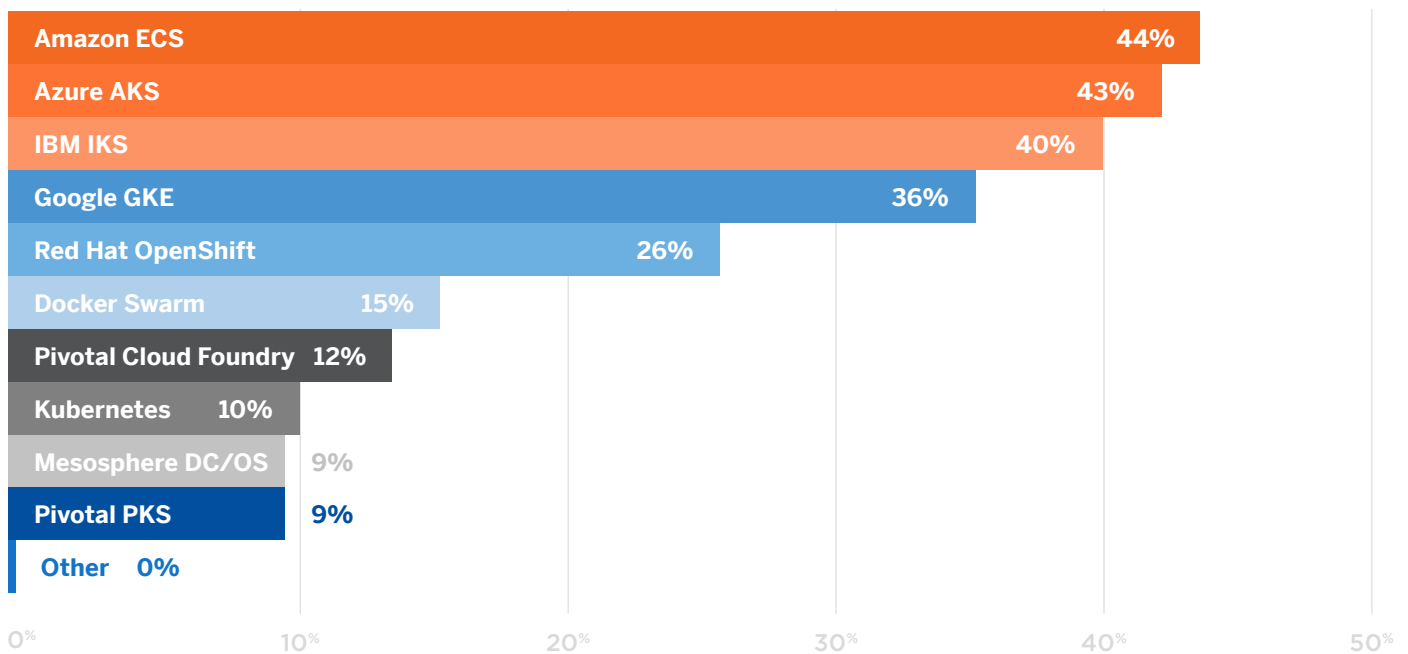
**Insight** — Of the respondents running in multiple cloud, 36 percent are running in all three major public cloud—AWS, Azure and Google. The most popular combination of two clouds is AWS + Azure (27 percent), followed by Azure + Google (24 percent), and then AWS + Google (13 percent).

## Kubernetes leads the container management race, and cloud-specific container offerings are increasingly popular

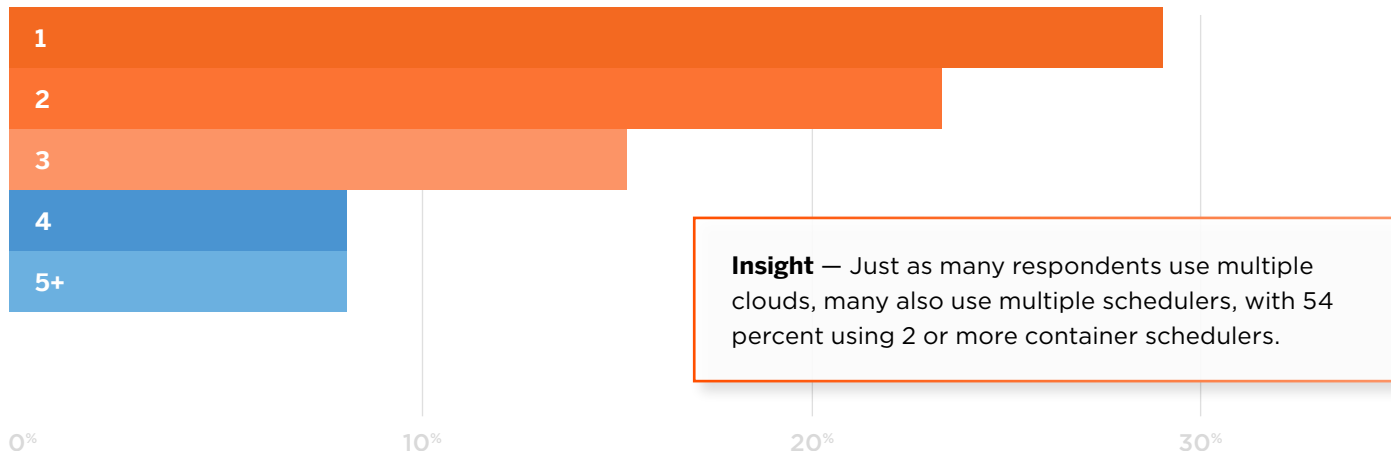
It will come as no surprise that Kubernetes leads the container management race, given that even formally non-Kubernetes-based options like Mesosphere DC/OS and Docker Enterprise are embracing Kubernetes as a container scheduler. Given an opportunity to name the container schedulers that they use, respondents most frequently named a Kubernetes option, whether that be pure open-source Kubernetes, or a vendor-specific Kubernetes offering like Azure AKS, Google GKE, IBM IKS, or Red Hat OpenShift.

The most popular single option was, somewhat surprisingly, Amazon ECS (44 percent), a non-Kubernetes container scheduler platform offered by Amazon, prior to the release of its Kubernetes-specific offering. While the survey contained an “other” option for respondents to include any container schedulers they use that were not listed, the report did not include Amazon EKS, Amazon’s Kubernetes service, as a specific option. Therefore, it is possible that some portion 44 percent of respondents who picked Amazon ECS meant Amazon EKS, an easy mistake to make. Amazon ECS was listed as a scheduler by 30 percent of respondents in the 2017 survey.

### Which container orchestration tools does your organization use? n=424

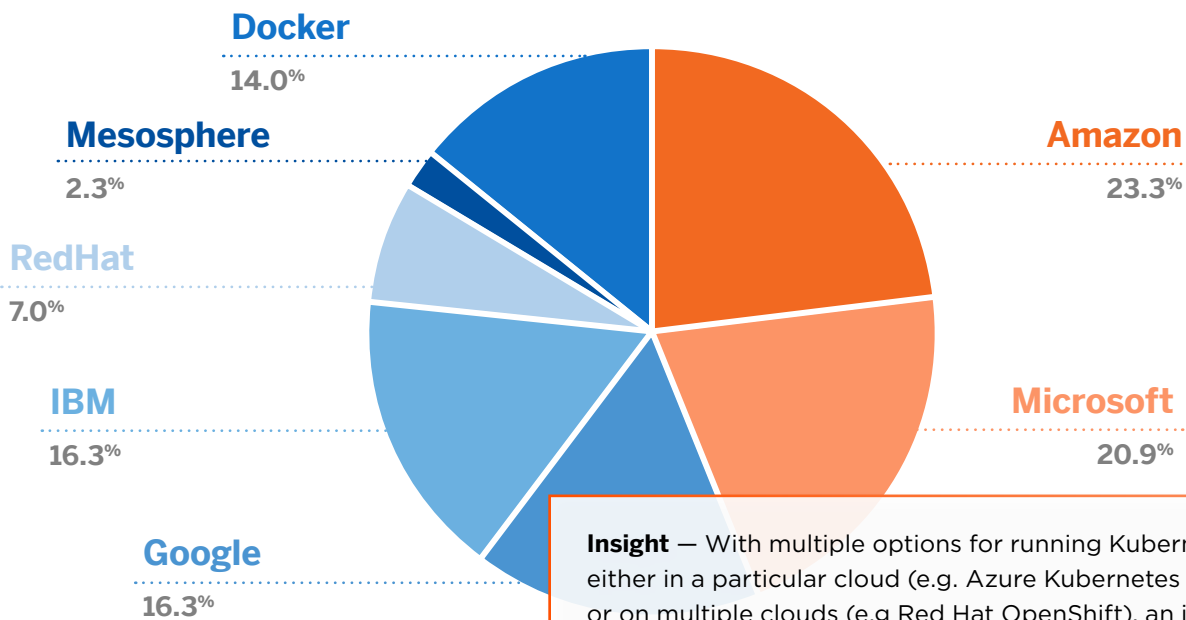


## How many different container orchestration tools do your organization use? n=424



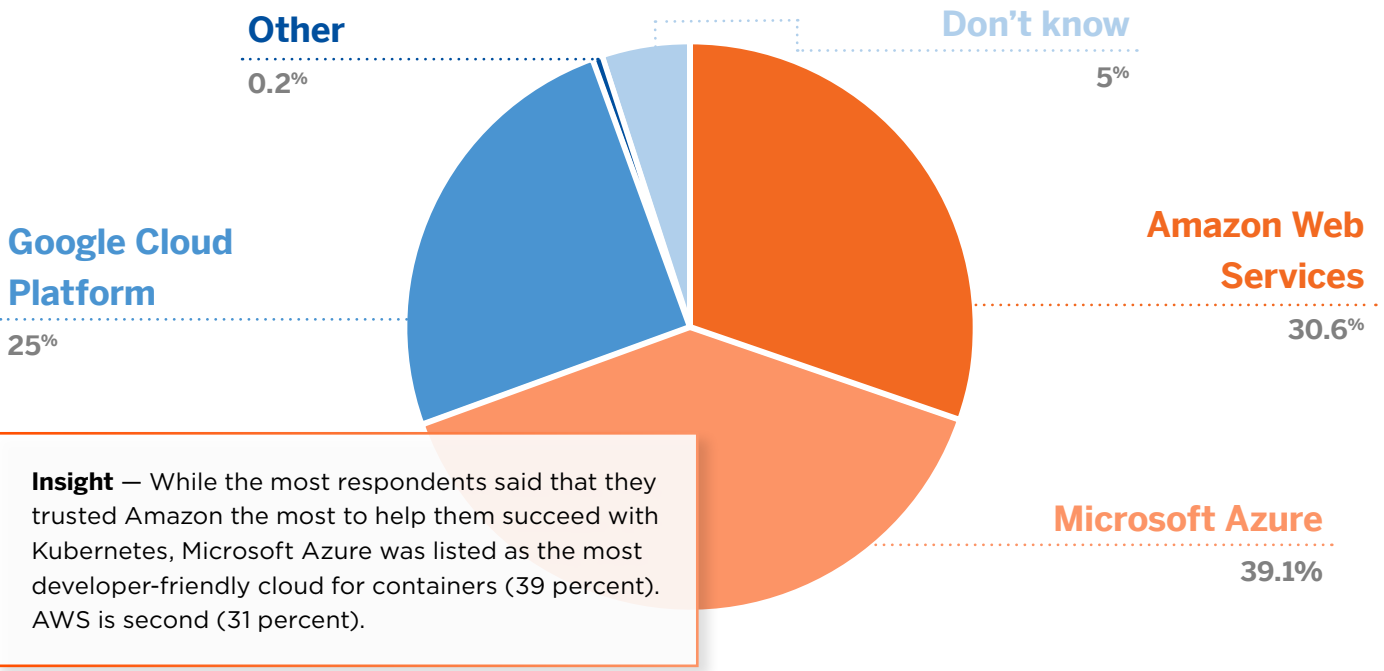
The clouds compete for container mindshare and usage.

## Which company do you most trust to help you succeed running Kubernetes? n=43

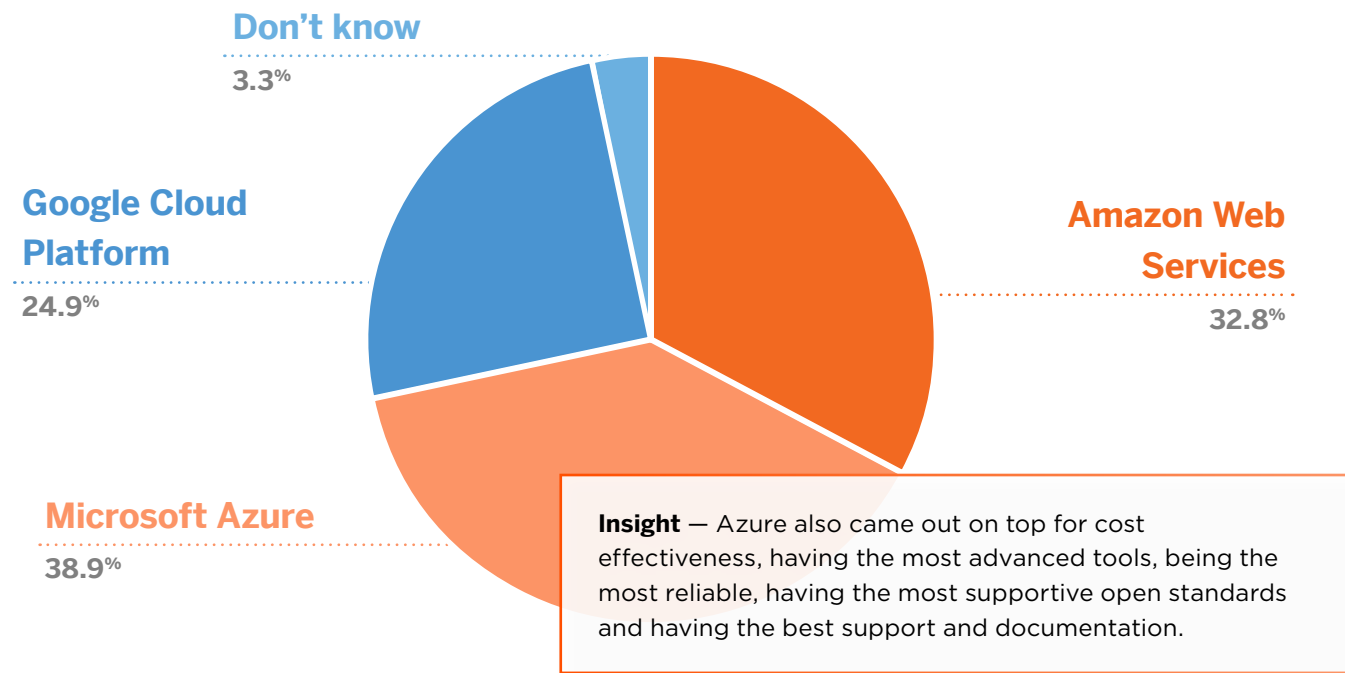


**Insight** — With multiple options for running Kubernetes either in a particular cloud (e.g. Azure Kubernetes Service) or on multiple clouds (e.g Red Hat OpenShift), an individual will decide who they trust most to help them on their Kubernetes journey. One would assume that an OpenShift user would trust Red Hat, and an IBM IKS user would trust IBM. The survey also looks at those only running “vanilla” Kubernetes, to see who they trusted. The most popular answers were the major cloud providers, in order of market share—Amazon (23 percent) Microsoft (21 percent) Google (16 percent) IBM (16 percent).

Which public cloud provider has the most developer-friendly environment for running containers? n=519

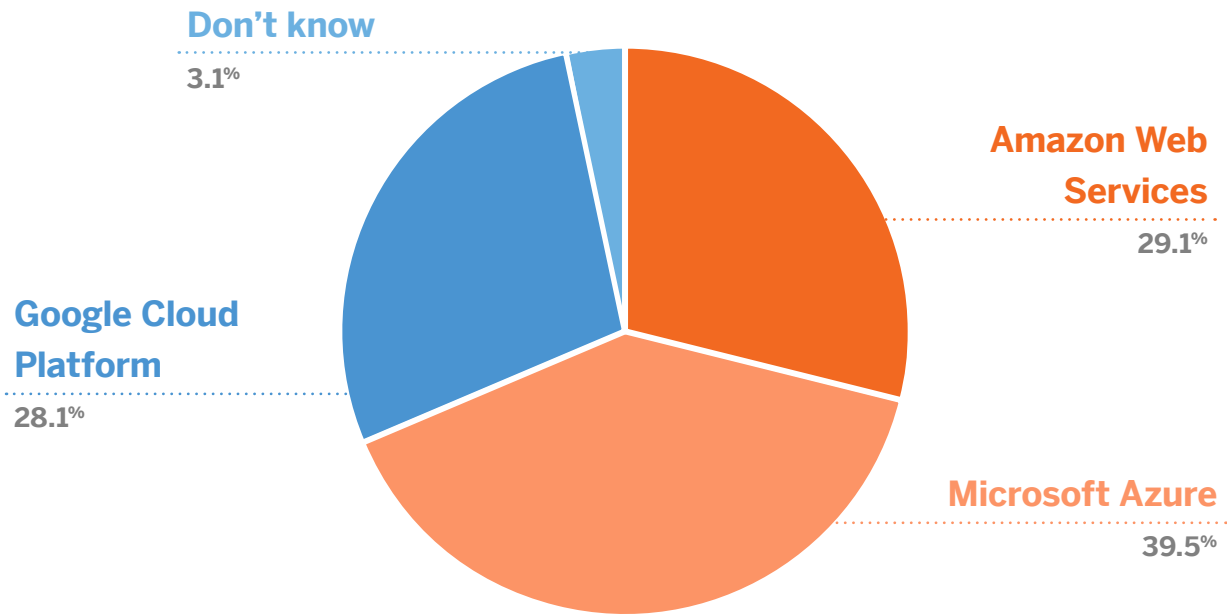


Which public cloud provider do you think has the most advanced features for monitoring and managing containerized applications?

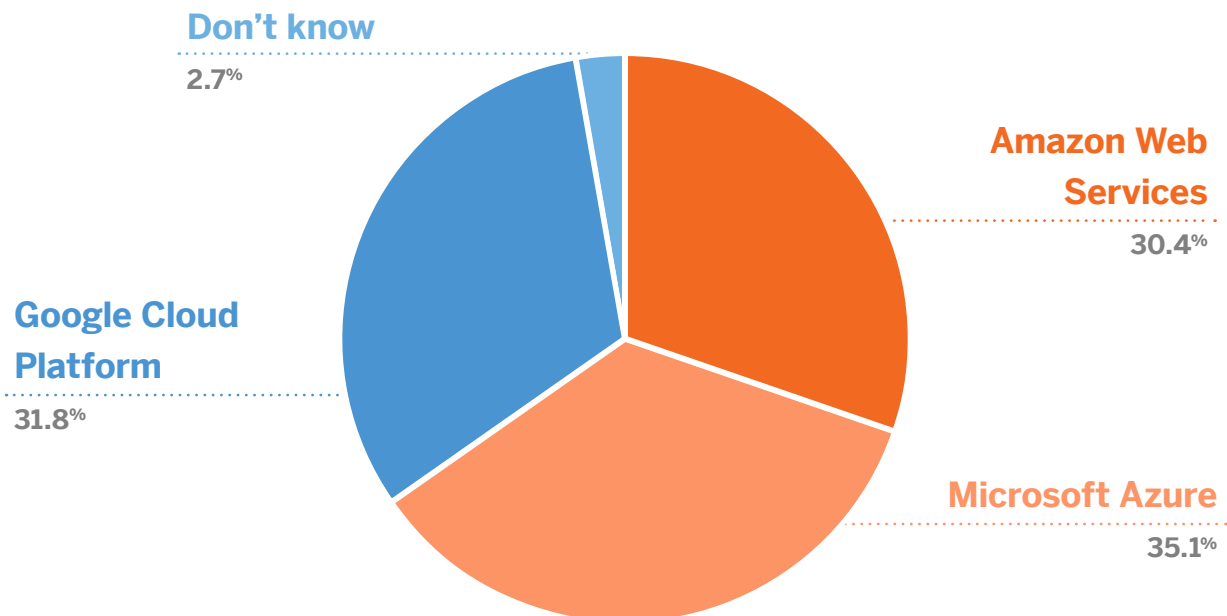




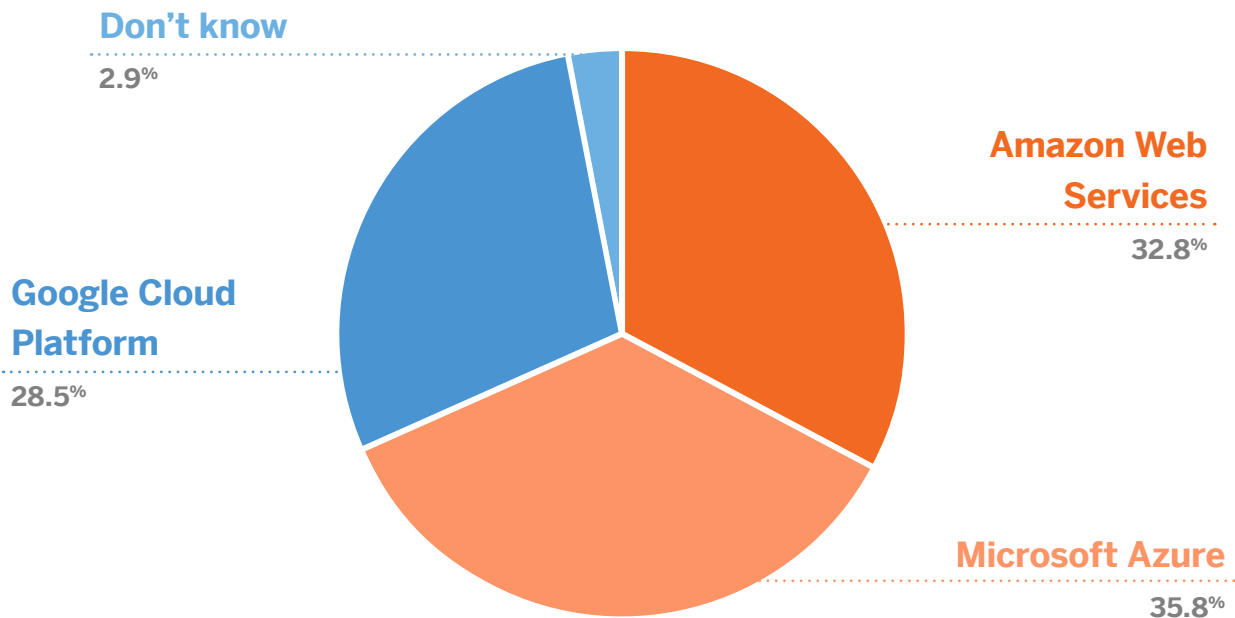
**Which public cloud provider do you view as most reliable for running containers? n=519**



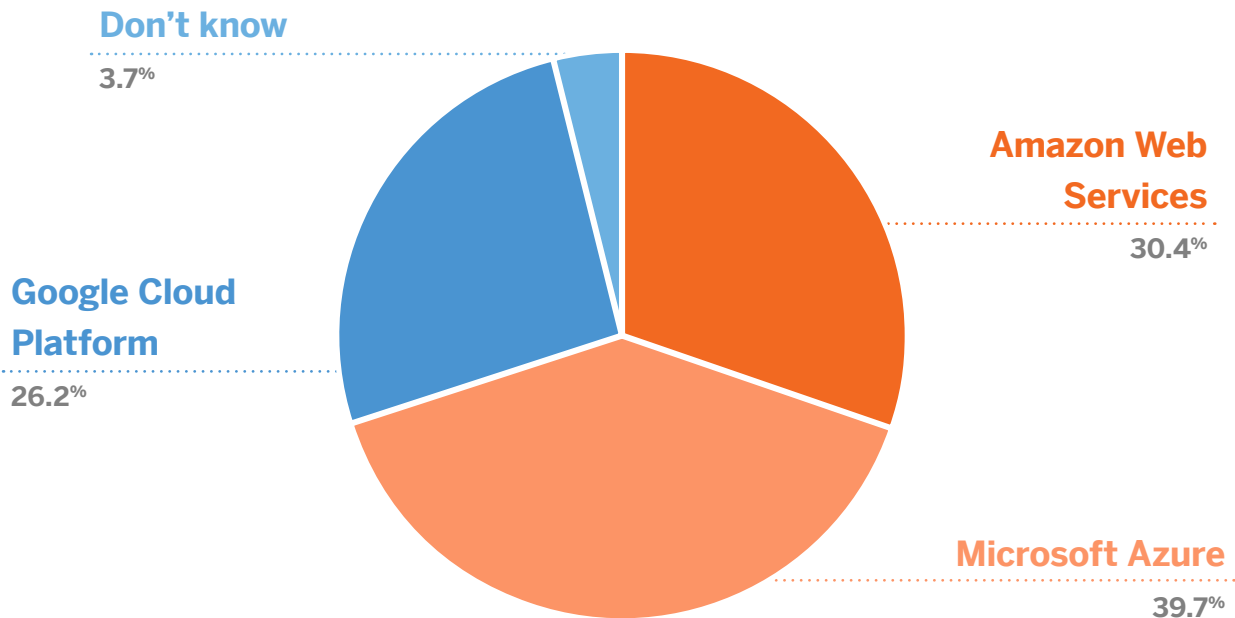
**Which public cloud provider do you consider to be the most supportive of open standards and application portability? n=519**



What public cloud provider do you view as the best value for the money? n=519

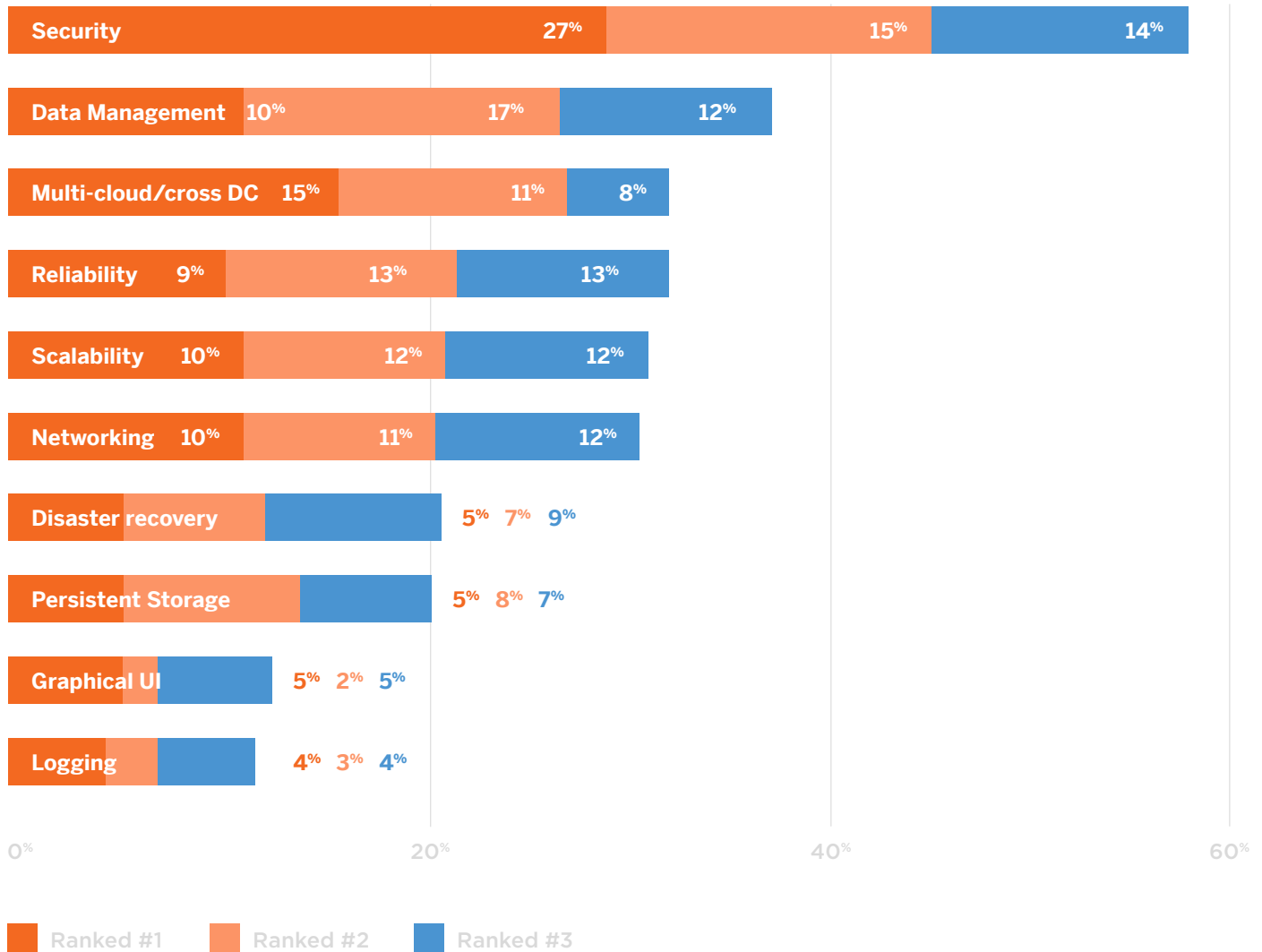


Which public cloud provider offers the best support and documentation for cloud application deployment? n=519



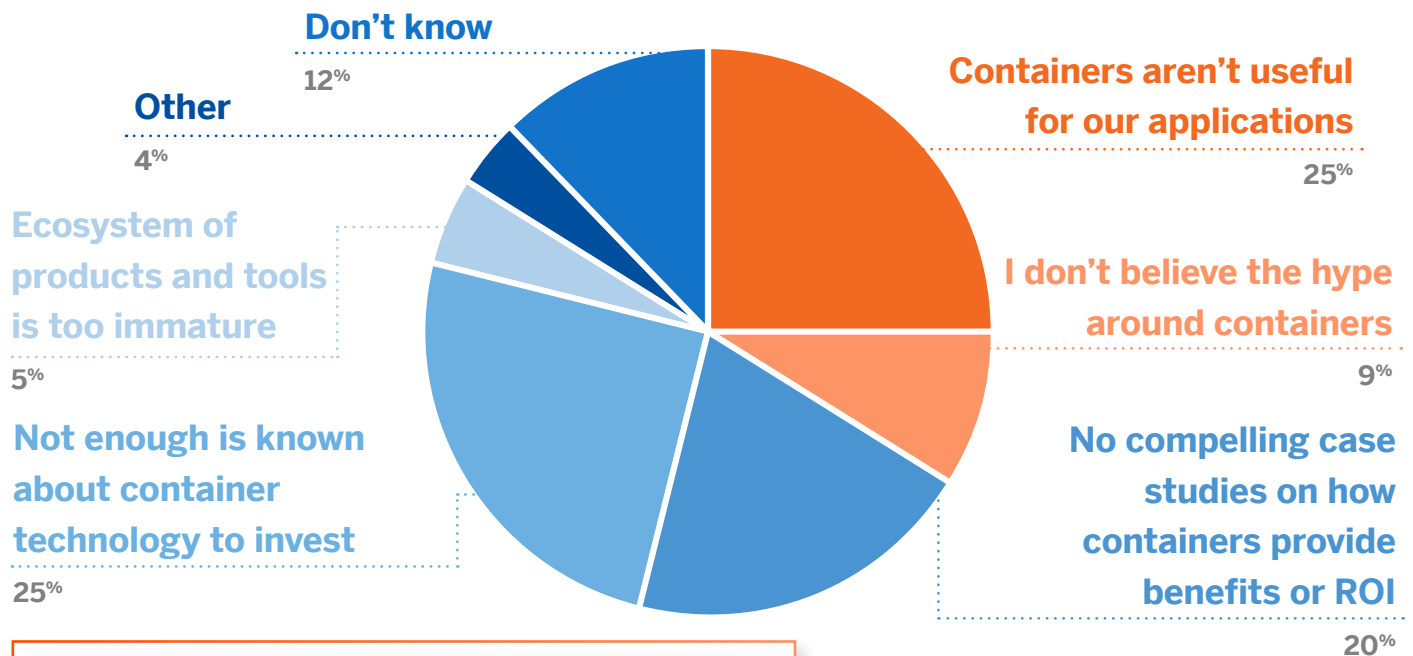
# Persistent storage challenges largely solved for containers; security, and data management changes remain

**In order to deploy containers, what are the top challenges that have been most difficult to overcome?**



**Insight** — When asked about their top challenges to deploy containers, security was listed as the most frequently reported challenge, at 56 percent of respondents top 3 challenges. Persistent storage, the top challenge of respondents in 2017, fell to #7 this year, however data management comes in at #2. This indicates that as the cloud native storage and container markets progress, higher level challenges (data management) replace lower level challenges (persistent storage).

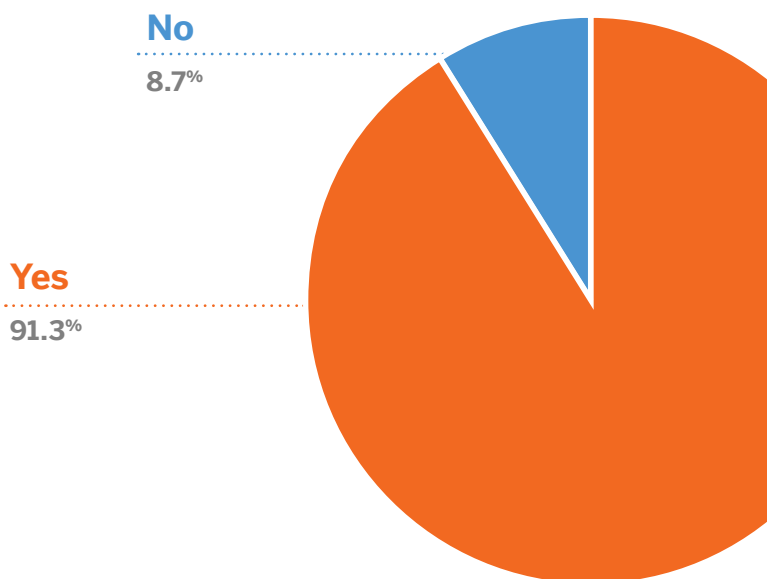
## What is the primary reason why your organization isn't using container technologies today? n=95



**Insight** —Of those not using containers, education is a big hurdle: 25 percent said not enough is known about the technology to invest resources in them.

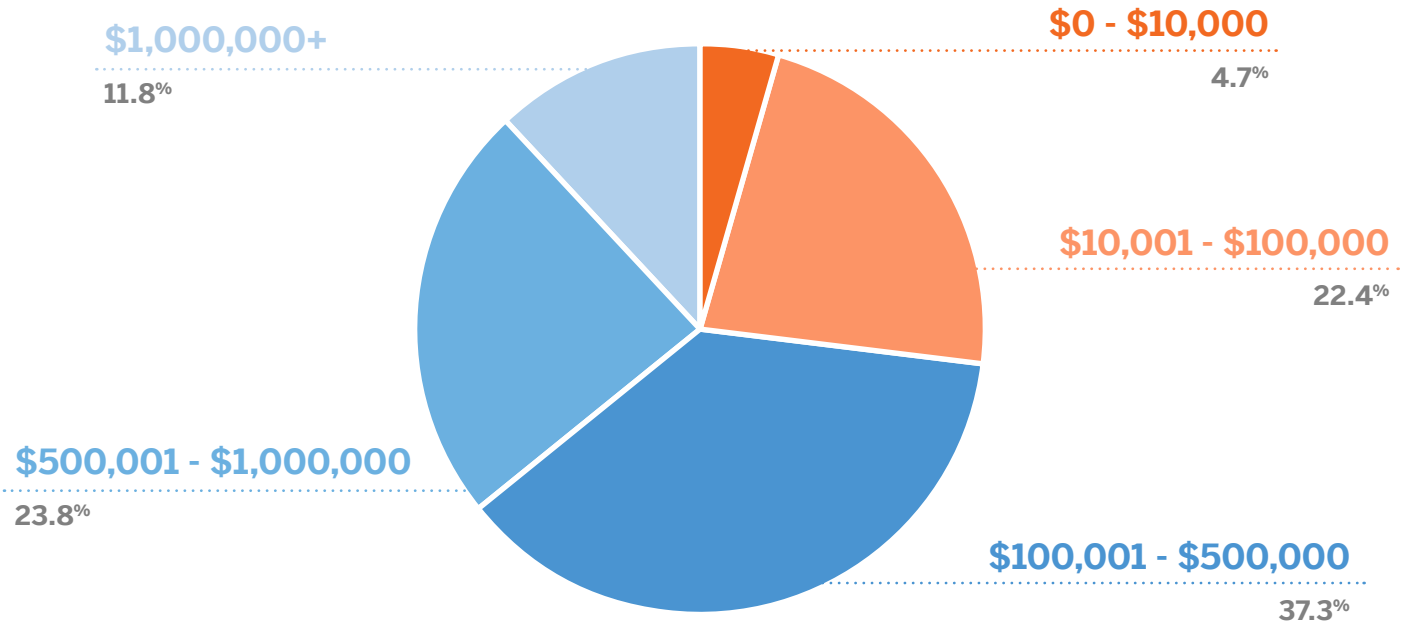
## Money flows increase toward container projects

### Is your organization making a financial investment in container technologies? n=424



**Insight** — The number of organizations making a financial investment in containers increased dramatically from 57 percent of respondents in 2017 to 91 percent of respondents in 2018. And the level of that investment is increasing with 12 percent of respondents saying that they are investing over \$1 million, compared to only 4 percent in 2016. In 2018, 36 percent of respondents said they are spending more than \$500,000 on container license and usage fees.

## How much of an annual financial investment has your company made in container technology licenses?



For more information about this report and survey, or to learn more about what Portworx can do for your team, please reach out to **Michael Ferranti** at [michael.ferranti@portworx.com](mailto:michael.ferranti@portworx.com).

## FULL SURVEY REPORT DATA

### q1: What department do you currently work in? n=519

IT	100%	519
Marketing	0%	0
Sales	0%	0
Finance	0%	0
Customer service	0%	0
Human resources	0%	0
Business development	0%	0
Other (please specify)	0%	0

### q2: How knowledgeable are you about what types of IT technologies your company uses?

Very knowledgeable	75%	389
Knowledgeable	22%	112
Somewhat knowledgeable	3%	18
Not very knowledgeable	0%	0
Not knowledgeable at all	0%	0

### q3: How knowledgeable are you about how much money is invested in IT technologies your company uses? n=519

Very knowledgeable	59%	307
Knowledgeable	25%	131
Somewhat knowledgeable	16%	81
Not very knowledgeable	0%	0
Not knowledgeable at all	0%	0

**q4: How many employees are in your organization? n=519**

1 - 99	0%	0
100 - 499	0%	0
500 - 999	21%	107
1,000 - 2,499	22%	115
2,500 - 4,999	15%	78
5,000 - 9,999	17%	86
10,000+	26%	133

**q5: Does your organization run container technologies? n=519**

Yes	82%	424
No	18%	95
Don't know	0%	0

**q5: Which of the following best describes your primary role? n=519**

DevOps	15%	79
Development	30%	158
Operations	34%	179
Security	11%	57
QA	4%	23
Other (please specify)	4%	23

**q6: In which industry is your organization? n=519**

Aerospace and Defense	1%	7
Banking	3%	18
Biotech	1%	3
Chemicals	0%	2
Computer Hardware	3%	15
Construction & Design	2%	11
Education	6%	30
Finance	4%	22
Government	4%	23
Health Care	9%	47
Insurance	2%	12
Legal	0%	2
Manufacturing	9%	48
Real estate/Development	0%	1
Recruiting	0%	0
Retail/Wholesale	6%	30
Professional Services	6%	30
Software	9%	48
Telecommunication	5%	27
Technology	24%	122
Transportation	2%	10
Utilities	1%	4
Other (please specify)	1%	7



**q8: What percentage of your apps are running in containers? n=424**

Less than 20%	10%	43
21 - 40%	23%	97
41 - 60%	33%	141
61 - 80%	23%	97
Greater than 80%	9%	39
Don't know	2%	7

**q9: In which of these non-production environments is your organization running containers? n=424**

Development	76%	321
Lab	37%	158
QA	47%	200
Testing	66%	279
Proof of Concept (POC)	45%	189
Other (please specify)	0%	1
<i>Average number of categories chosen</i>	<i>2.71</i>	<i>2.71</i>

**q10: What is the primary reason why your organization is running container technologies? n=424**

Increase developer efficiency	32%	137
Support microservices architectures	12%	49
Enable applications to run on multiple cloud platforms (avoid lock-in)	30%	128
Save on infrastructure costs	26%	110
Other (please specify)	0%	0

**q11: Is your organization running container technologies in production? n=424**

Yes	83%	354
No	15%	63
Don't know	2%	7

**q12: Which container orchestration tools does your organization use? n=424**

Kubernetes	10%	43
Docker Swarm	15%	63
Mesosphere DC/OS	9%	39
Pivotal Cloud Foundry	12%	50
Pivotal PKS	9%	40
Amazon ECS	44%	186
Azure AKS	43%	184
Google GKE	36%	153
IBM IKS	40%	171
Red Hat OpenShift	26%	109
Other (please specify)	0%	1
<i>Average number of categories chosen</i>	2.45	2.45

**q13: Which company do you most trust help you succeed running Kubernetes? n=43**

Amazon	23%	10
Microsoft	21%	9
Google	16%	7
IBM	16%	7
Pivotal	0%	0
RedHat	7%	3
Mesosphere	2%	1
Heptio	0%	0
Docker	14%	6
Other (please specify)	0%	0

**q15: What storage challenges have you experienced when trying to run stateful containers? n=424**

Provisioning storage takes too long	37%	156
Storage does not effectively scale with number of containers	42%	179
Inadequate tools for managing container storage	43%	181
Concerns about data loss	59%	249
Block devices like Amazon EBS are slow to mount	38%	159
Other (please specify)	0%	2
Don't know	1%	5
<i>Count</i>	2.20	2.20

**q16: Is your organization making a financial investment in container technologies? n=424**

Yes	91%	387
No	9%	37

**q17: When does your organization plan to make an investment in container technologies? n=37**

0 - 6 months	8%	3
7 - 12 months	24%	9
13 - 18 months	16%	6
19 - 24 months	11%	4
More than 24 months	8%	3
Not planning to invest	16%	6
Don't know	16%	6

**q18: How long has your organization been making a financial investment in container technologies? n=387**

0 - 6 months	6%	24
7 - 12 months	26%	101
13 - 18 months	30%	115
19 - 24 months	18%	69
More than 24 months	19%	74
Don't know	1%	4

**q19: How much of an annual financial investment has your company made in container technology license and usage fees? n=424**

\$0 - \$10,000	5%	20
\$10,001 - \$100,000	22%	95
\$100,001 - \$500,000	37%	158
\$500,001 - \$1,000,000	24%	101
More than \$1,000,000	12%	50

**q20: How much of an annual financial investment has your company made in personnel expenses to use container technologies? n=424**

\$0 - \$10,000	8%	36
\$10,001 - \$100,000	24%	103
\$100,001 - \$500,000	35%	147
\$500,001 - \$1,000,000	21%	87
More than \$1,000,000	12%	51

**q21: What is the primary reason why your organization isn't using container technologies today? n=95**

Containers aren't useful for our applications	25%	24
I don't believe the hype around containers	9%	9
No compelling customer case studies around how containers provide benefits or ROI	20%	19
Not enough is known about container technologies to invest any resources in them	25%	24
Ecosystem of products and tools is too immature	5%	5
Other (please specify)	3%	3
Don't know	12%	11

**q22: Which public cloud provider has the most developer-friendly environment for running containers? n=519**

Amazon Web Services	31%	159
Microsoft Azure	39%	203
Google Cloud Platform	25%	130
Other (please specify)	0%	1
Don't know	5%	26

**q23: Which public cloud provider do you think has the most advanced features for monitoring and managing containerized applications? n=519**

Amazon Web Services	33%	170
Microsoft Azure	39%	202
Google Cloud Platform	25%	129
Other (please specify)	0%	1
Don't know	3%	17

**q24: Which public cloud provider do you view as most reliable for running containers? n=519**

Amazon Web Services	29%	151
Microsoft Azure	39%	205
Google Cloud Platform	28%	146
Other (please specify)	0%	1
Don't know	3%	16

**q25: Which of the following public cloud providers do you currently use to run containers? n=519**

Amazon Web Services	42%	217
Microsoft Azure	57%	294
Google Cloud Platform	39%	205
Other (please specify)	3%	15
Don't know	5%	25
<i>Count</i>	<i>1.46</i>	<i>1.46</i>

**q26: How much do you agree or disagree with the following statement? Serverless will make containers obsolete. n=424**

Strongly disagree	6%	26
Somewhat disagree	23%	97
Neither agree nor disagree	31%	130
Somewhat agree	28%	117
Strongly agree	13%	54

**q27: Which public cloud provider do you consider to be most supportive of open standards and application portability? n=519**

Amazon Web Services	30%	158
Microsoft Azure	35%	182
Google Cloud Platform	32%	165
Other (please specify)	0%	0
Don't know	3%	14

**q28: Which public cloud provider do you view as the best value for money? n=519**

Amazon Web Services	33%	170
Microsoft Azure	36%	186
Google Cloud Platform	29%	148
Other (please specify)	0%	0
Don't know	3%	15

**q29: Which public cloud provider offers the best support and documentation for cloud application deployment? n=519**

Amazon Web Services	30%	158
Microsoft Azure	40%	206
Google Cloud Platform	26%	136
Other (please specify)	0%	0
Don't know	4%	19